EXERCISES

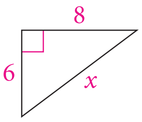
For more practice, see *Extra Practice.*

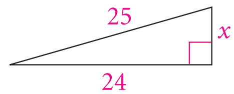
Practice and Problem Solving

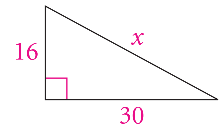
A Practice by Example

x^2 **Algebra** **Find the value of x.**

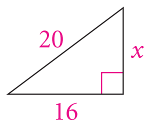
Example 1 (page 358)

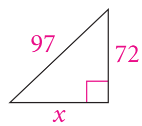
1.


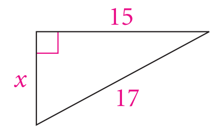
2.


3.


x^2 **Algebra** **Find the value of x.**

4.


5.


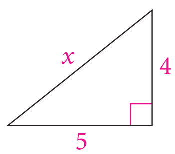
6.


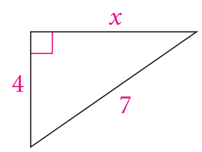
Does each set of numbers form a Pythagorean triple? Explain.

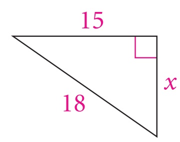
7. 4, 5, 6 **8.** 10, 24, 26 **9.** 15, 20, 25

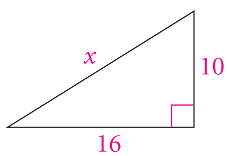
Example 2 (page 358)

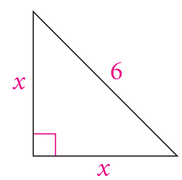
x^2 **Algebra** **Find the value of x. Leave your answer in simplest radical form.**

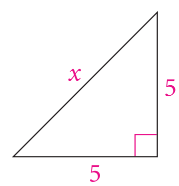
10.


11.


12.


13.


14.


15.


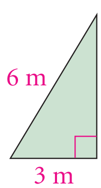
Example 3 (page 358)

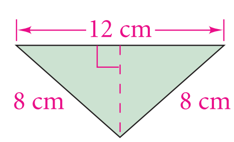
16. **Home Maintenance** A painter leans a 15-ft ladder against a house. The base of the ladder is 5 ft from the house. To the nearest foot, how high on the house does the ladder reach?

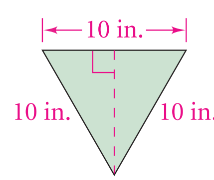
17. A walkway forms the diagonal of a square playground. The walkway is 24 m long. To the nearest tenth of a meter, how long is a side of the playground?

Example 4 (page 359)

Find the area of each triangle. Leave your answer in simplest radical form.

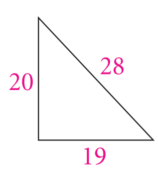
18.


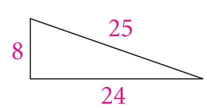
19.


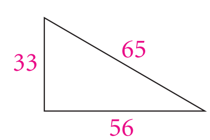
20.


Example 5 (page 359)

Is each triangle a right triangle? Explain.

21.


22.


23.


Example 6 (page 360)

The lengths of the sides of a triangle are given. Classify each triangle as acute, right, or obtuse.

24. 15, 8, 21 **25.** 12, 16, 20 **26.** 4, 5, 6

27. 30, 34, 16 **28.** 0.3, 0.4, 0.6 **29.** 11, 12, 15

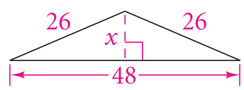
30. $\sqrt{3}, 2, 3$ **31.** 18, 80, 82 **32.** 20, 21, 28

33. 31, 23, 12 **34.** 30, 40, 50 **35.** $\sqrt{11}, \sqrt{7}, 4$

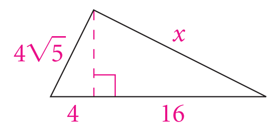
B Apply Your Skills

x^2 **Algebra** **Find the value of x. Leave your answer in simplest radical form.**

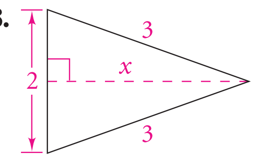
36.



37.



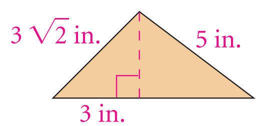
38.



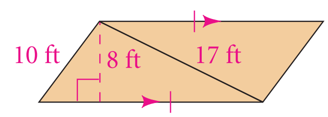
39. **Writing** Each year in an ancient land, a large river overflowed its banks, often destroying boundary markers. The royal surveyors used a rope with knots at 12 equal intervals to help reconstruct boundaries. Explain how a surveyor could use this rope to form a right angle. (*Hint*: Use the Pythagorean triple 3, 4, 5.)

Find the area of each figure.

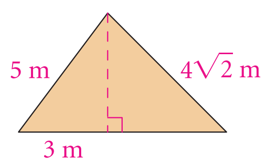
40.



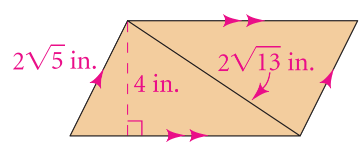
41.



42.



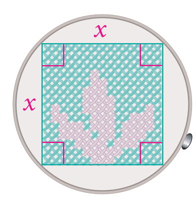
43.



Reading Math

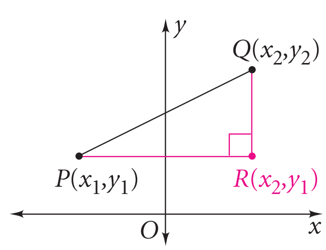
For help with reading and solving Exercise 44, see p. 365.

44. **Embroidery** You want to embroider a square design. You have an embroidery hoop with a 6 in. diameter. Find the largest value of x so that the entire square will fit in the hoop. Round to the nearest tenth.



45. In parallelogram $RSTW$, $RS = 7$, $ST = 24$, and $RT = 25$. Is $RSTW$ a rectangle? Explain.

Proof **46.** **Coordinate Geometry** You can use the Pythagorean Theorem to prove the Distance Formula. Let points $P(x_1, y_1)$ and $Q(x_2, y_2)$ be the endpoints of the hypotenuse of a right triangle.

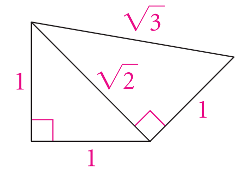


a. Write an algebraic expression to complete each of the following:
$PR = \blacksquare$ and $QR = \blacksquare$.

b. By the Pythagorean Theorem, $PQ^2 = PR^2 + QR^2$. Rewrite this statement substituting the algebraic expressions you found for PR and QR in part (a).

c. Complete the proof by taking the square root of each side of the equation that you wrote in part (b).

47. Constructions Explain how to construct a segment of length $\sqrt{n}$, where n is any positive integer, and you are given a segment of length 1. (*Hint*: See the diagram.)



Find a third whole number so that the three numbers form a Pythagorean triple.

48. 20, 21 **49.** 14, 48 **50.** 13, 85 **51.** 12, 37

Need Help?
Remember that the sum of the lengths of any two sides of a triangle must be greater than the length of the third side.

Find integers *j* and *k* so that (a) the two given integers and *j* represent the lengths of the sides of an acute triangle and (b) the two given integers and *k* represent the lengths of the sides of an obtuse triangle.

52. 4, 5 **53.** 2, 4 **54.** 6, 9 **55.** 5, 10

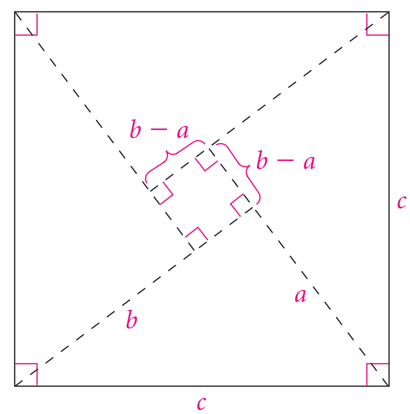
56. 6, 7 **57.** 9, 12 **58.** 8, 17 **59.** 9, 40

Proof **60. Reasoning** You can use the diagram at the right to prove the Pythagorean Theorem.

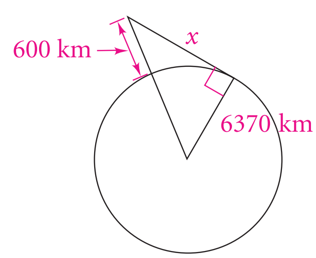
a. Find the area of the large square in terms of c.

b. Find the area of the large square in terms of a and b by adding the areas of the four triangles and the small square.

c. Write an equation setting your answers to part (a) and part (b) equal to each other. Simplify the equation to complete the proof.



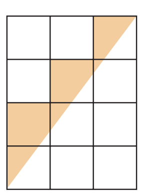
61. Astronomy The Hubble Space Telescope is orbiting Earth 600 km above Earth's surface. Earth's radius is about 6370 km. Use the Pythagorean Theorem to find the distance x from the telescope to Earth's horizon. Round your answer to the nearest ten kilometers.



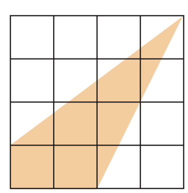
not to scale

The figures below are drawn on centimeter grid paper.
Find the perimeter of each shaded figure to the nearest tenth.

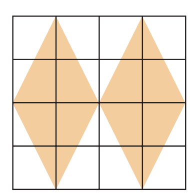
62.



63.



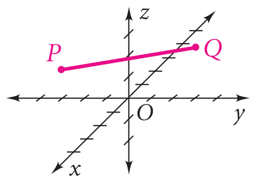
64.



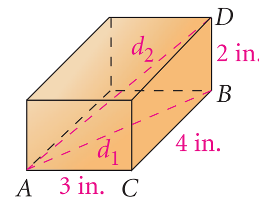
Challenge

65. a. The ancient Greek philosopher Plato used the expressions $2n$, $n^2 - 1$, and $n^2 + 1$ to produce Pythagorean triples. Choose any integer greater than 1. Substitute for n and evaluate the three expressions.

b. Verify that your answers to part (a) form a Pythagorean triple.



66. **Geometry in 3 Dimensions** The box at the right is a rectangular solid.



a. Use $\triangle ABC$ to find the length d_1 of the diagonal of the base.

b. Use $\triangle ABD$ to find the length d_2 of the diagonal of the box.

c. You can generalize the steps in parts (a) and (b). Use the facts that $AC^2 + BC^2 = d_1^2$ and $d_1^2 + BD^2 = d_2^2$ to write a one-step formula to find d_2.

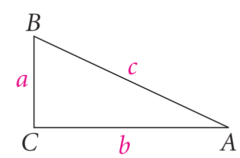
d. Use the formula you wrote to find the length of the longest fishing pole you can pack in a box with dimensions 18 in., 24 in., and 16 in.

Geometry in 3 Dimensions **Points $P(x_1, y_1, z_1)$ and $Q(x_2, y_2, z_2)$ at the left are points in a three-dimensional coordinate system. Use the following formula to find PQ. Leave your answer in simplest radical form.**

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

67. $P(0, 0, 0), Q(1, 2, 3)$ **68.** $P(0, 0, 0), Q(-3, 4, -6)$ **69.** $P(-1, 3, 5), Q(2, 1, 7)$

Proof **70.** Use the plan and write a paragraph proof of Theorem 7-5, the Converse of the Pythagorean Theorem.



Given: $\triangle ABC$ with sides of length a, b, and c where $a^2 + b^2 = c^2$

Prove: $\triangle ABC$ is a right triangle.

Plan: Draw a right triangle (not $\triangle ABC$) with legs of lengths a and b. Label the hypotenuse x. By the Pythagorean Theorem, $a^2 + b^2 = x^2$. Use substitution to compare the lengths of the sides of your triangle and $\triangle ABC$. Then prove the triangles congruent.

Standardized Test Prep

Gridded Response

71. The lengths of the legs of a right triangle are 17 m and 20 m. To the nearest tenth of a meter, what is the length of the hypotenuse?

72. The hypotenuse of a right triangle is 34 ft. One leg is 16 ft. Find the length of the other leg in feet.

73. What whole number forms a Pythagorean triple with 40 and 41?

74. The two shorter sides of an obtuse triangle are 20 and 30. What is the least whole number length possible for the third side?

75. Each leg of an isosceles right triangle has measure 10 cm. To the nearest tenth of a centimeter, what is the length of the hypotenuse?

Take It to the NET
Online lesson quiz at
www.PHSchool.com
Web Code: afa-0702

Mixed Review

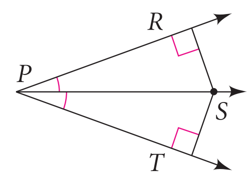
Lesson 7-1

76. Find the area of an isosceles right triangle that has one leg of length 12 cm.

77. An isosceles right triangle has area of 112.5 ft^2. Find the length of each leg.

Lesson 5-2

In the figure, $\overrightarrow{PS}$ bisects $\angle RPT$. Solve for each variable. Then find RS.



78. $RS = 2x + 19, ST = 7x - 16;\ x = ■, RS = ■$

79. $RS = 2(7y - 11), ST = 5y + 5;\ y = ■, RS = ■$

Lesson 4-1

$\triangle PQR \cong \triangle STV$. Solve for each variable.

80. $m\angle P = 4w + 5, m\angle S = 6w - 15$

81. $RQ = 10y - 6, VT = 5y + 9$

82. $m\angle T = 2x - 40, m\angle Q = x + 10$

83. $PR = 2z + 3, SV = 4z - 11$